

Overview of the Electric Industry

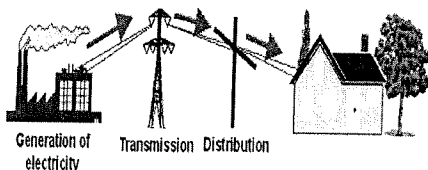
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Outline

- Three Segments of Electric Industry
 - Generation
 - Transmission
 - Distribution
- Jurisdiction
- Introduction of Competition in the Electric Industry
 - New Players
 - RTOs
- Public Acts 141 and 142 – Restructured Michigan's Electric Industry (Steve Transeth)

The Process of Generating and Transporting Electricity



Generation: The Commodity of Power

- Power Plants
- Turbine Spins Magnet around Copper Coils to generate electric current - AC - 60 Hz

Transmission: Transport the commodity

- High Voltage
- Bulk Transport
- Long Range - Nationwide Network

Distribution: Transport and distribute the commodity

- Low Voltage
- Distribute to end users
- Short Range - Local Network

Generation is further segmented (for regulatory purposes)...

- Wholesale Generation Transactions
 - Bulk Quantities
 - Transactions between two Suppliers
- Retail Generation Transactions
 - End-user quantities
 - Transactions between Customer and Supplier

Generation = Electric Power Measured in units of Watts...

200 – 400 W



Watts (W)

100 W



Kilowatts (KW)

1000 W = 1 KW

~ 2 KW



500 – 1,500 KW



Megawatts (MW)

1000 KW = 1 MW

1 – 100 MW



Power Used over Time is measured in...

**Watts
Hours
(Wh)**



200 Wh = 100 W bulb
burning for 2 hours.

**Kilowatt Hours
(KWh)**

1000 Wh = 1 KWh



Annually,
around 7,500
KWh

**Megawatt Hours
(MWh)**

1000 KWh = 1 MWh



Annually as much as
15,000 MW

Electric Industry Unique...

- Cannot Store Electricity
(in general)
- Cannot Route Electricity
- Customers "demand" electricity
whenever they want it
- Electric Industry must be ready
and able to provide electricity
at all times, even peak
demand.

Power Plants

Base Load Plants

- Typically Coal or Nuclear
- Large ~ 1000 MW (1 GW)
- Operate 24/7

Peaking Plants

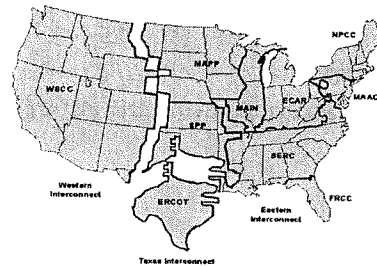
- Typically Natural Gas
- Smaller ~100 - 500 MW
- Typically only operated for
peak demand

Transmission...

- The **GRID** = High voltage *transmission* lines
- Interconnected
 - connects power plants & utilities across nation
- Increases reliability

Three U.S. Grids

1. Eastern Interconnect
Includes Michigan
2. Western Interconnect
3. Texas Interconnect



Distribution...

- Transformers take high voltage transmission and drop it down to low voltage
- Typically most outages occur due to disruptions in the distribution network
 - Weather
 - Trees

Federal Jurisdiction

What Federal Act Grants Authority?

- Federal Power Act of 1935

Who is Regulating Agency?

- Federal Energy Regulatory Commission (FERC)

What is under federal purview?

- Wholesale Generation
- Transmission
- Licensing of hydroelectric facilities
- Nuclear Power Plants (NRC - Nuclear Regulatory Commission)

State Jurisdiction

What State Act Grants Authority?

- 1939 PA 3 Public Service Commission Act
- 1909 PA 106 Electric Transmission Act
- 1909 PA 300 Railroad Commission Act

Who is Regulating Agency?

- Michigan Public Service Commission (MPSC)

What is under state purview?

- Retail Generation
- Distribution
- Metering
- Siting of Power Plants & Transmission facilities.

U.S. Electric Industry Has been changing...

- Competition, new players, and Open Access...

...have been *injected* into an industry traditionally controlled by...

Vertically Integrated Monopolies

Old Paradigm—

Vertically Integrated Monopoly

- **Generation**
 - **Transmission**
 - **Distribution**
- } All Provided *and Owned* by Investor Owned Utility

Federal Government Moved toward Competition in the two segments under its purview

- Wholesale Generation
- Transmission

Many state's also moved to open up the **retail generating** segment

Currently sixteen states and the District of Columbia allow retail open access

- | | |
|------------------------|---------------------------|
| • Arizona | California (suspended) |
| • Connecticut | Delaware |
| • District of Columbia | Illinois |
| • Maine | Maryland |
| • Massachusetts | Michigan (PA 141 and 142) |
| • New Hampshire | New Jersey |
| • New York | Ohio |
| • Pennsylvania | Rhode Island |
| • Texas | Virginia |

Various Players or Entities in the Electric Industry are...

- Suppliers
- Transmitters
- Distributors
- Merchant Plants
- Regional Transmission Organizations (RTOs)

Suppliers—Supply the commodity to consumers, *they do not necessarily own* generating facilities.

- Investor Owned Utilities (IOUs)
 - *Obligation to serve*
 - *Detroit Edison*
 - *Consumers Energy*
 - *American Electric Power*
- Municipals
 - Within city boundaries
 - Generally not regulated by MPSC
 - Eg. Lansing Board of Water and Light

More Suppliers...

- Cooperatives
 - Member owned
 - Typically rural
 - Michigan Electric Cooperative Association (MECA)
- Alternative Electric Suppliers (AES)
 - An entity (other than the incumbent utility) that sells electricity to retail customers in Michigan
 - Brokers
 - Independent Power Producers (IPPs)
 - Eg. Quest; Constellation

Transcos

- Companies that only transmit electricity
- Transcos operating in Michigan:
 - International Transmission Company (ITC)
 - Michigan Electric Transmission Company (METC)
 - American Transmission Company (ATC)

Discos

- Distribution Companies
- Take electricity from the transmission system and distribute to end-users
- Typically the Investor Owned Utility (IOU)

Merchant Plants

- A power plant owned by an Independent Power Producer (IPP)
- Typically Natural Gas
- Generate power and sell on the wholesale generation market
- Location of facility is a business decision...
 - Is there a market for my power?
 - Located near transmission lines and natural gas pipelines

Regional Transmission Organization (RTO)

- FERC Developed Concept - Help support open access and competition
- Level the playing field - Operate Grid in a fair and independent manner
- Regional - Large, Independent,
- PA 141 of 2000 requires Michigan IOUs to join a RTO or divest transmission.
 - They did both

RTOs Operating in Michigan

- Midwest Independent Transmission System Operator (MISO)

Detroit Edison

ITC

Consumers Energy

METC

ATC

- PJM Interconnection L.L.C.

- American Electric Power

2000 PA 141
and
2000 PA 142

MCL 460.1 to 460.10cc

*"Customer Choice and
Electricity Reliability Act"*

Amend PA 3 of 1939

- PA 141: Restructure Industry
- PA 142: Securitization

Common Elements of All State Restructuring Laws

- Reliability
- Which customers get to Choose & When
- Licensing of Alternative Suppliers
- Paying for the Transition
 - Stranded Costs
 - Securitization
- Market Power Mitigation
- Code of Conduct
- Renewable Energy
- New Technologies
- Energy Efficiency
- Environmental Air Quality
- Programs for People of Low Income
- Consumer Protection
 - Shut off Protection
 - Information
 - Education
- Displaced Utility Employees

Thank You!

Questions?

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